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ABSTRACT

This study evaluated the relationship between musical independence and: students' gender; home environment; high school and college academic and musical experiences; and college instrumental organization, major, and instrument. The study also evaluated students' opinions regarding attrition in music education and evaluated the spectrum of musical skills from moderate to advanced musical independence. Ball State University band students (N=153) were administered the Instructional Student College Survey and Colwell's Music Achievement Test 3. The study's findings included: (1) musical independence is developed by participating in numerous and varied high school ensembles and/or musical activities; (2) musically independent students practiced more, took more music lessons, participated in more recitals, earned higher Scholastic Achievement Test scores, and attended more classical concerts; (3) quantitative and qualitative practice time is related to musical growth; (4) musical independence is enhanced by some academic/family indicators; (5) acquiring and developing musical independence consists of four areas--native intellectual skills, musical experiences, time on task, and effective study habits; and (6) playing woodwind and brass instruments contributes more to developing musical independence than playing percussion instruments. (Includes five references) (JDD)

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POSTSECONDARY MUSICAL INDEPENDENCE AND RELATED HIGH SCHOOL/COLLEGE EXPERIENCES

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POSTSECONDARY MUSICAL INDEPENDENCE AND RELATED HIGH SCHOOL/COLLEGE EXPERIENCES

I. INTRODUCTION

Bobbett (1989) evaluated musical independence (MI) in conjunction with related academic and musical activities of instrumental music students and programs at the University of Tennessee (UT). Some of the study's findings were inconclusive and required validation/evaluation. For instance, if there is a direct relationship between student practice time and MI, what specific practice activities have the greatest or least influence on the student's growth? In addition, if advanced MI music majors tend to change their major after the freshman year and moderate MI students do not, is the UT study an exception or a possible trend?

The music faculty at Ball State University agreed to participate in a follow-up research project. The study's four questions were:

(1) Do high school /college activities influence the students' and programs' musical independence?
(2) What similarities/ differences are between: (a) the top and training ensembles, (b) brass, woodwind and percussion students, (c) music and non-music majors, and (d) male and female students?
(3) If practice (time-on-task) influences MI, what types of practice activities accelerate and promote MI? and
(4) Do advanced musically independent instrumental students quit after their freshman year and if so, why?

The student questionnaire consisted of Colwell's MAT3 and the Instrumental Student College Survey (ISCS), which expanded the UT demographic survey items. Since the research addressing post-secondary student outcomes (musical independence) is limited, many ISCS areas are not amply reflected in the music education literature. The additional "exploration" questions might help explain some of the present unknowns regarding excellence in instrumental music. Finally, if MI can be successfully identified and measured, then the next step is to evaluate the musical activities that promote MI. This might be accomplished by evaluating the relationship between MI and related academic and musical activities.

II. PURPOSES

The first purpose of this study was to evaluate the relationship between MI and the students': (1) home environment, (2) high school academic and musical experiences, (3) college academic and musical experiences, and (4) college instrumental organization, college major, instrument, and gender. The second purpose for this study was to evaluate the students' opinions regarding attrition in music education. The third, purpose of this study was to evaluate the spectrum of musical skills from moderate MI to advanced MI based on the collective results of the study.

III. TEST QUESTIONNAIRE

Demographics (ISCS) The three demographic categories include:

1. **General** questions sought information regarding the organization/s in which they played, their instrument, gender, age, race, years of instrumental experience, class (e.g., freshman, senior, graduate), major, years of piano training, and parents' educational background.

2. **High School** questions were subdivided into two categories: (1) academics and (2) musical activities. High school academic questions gathered data on student grade point average (GPA), ACT/SAT scores, states where they graduated from high school, grade they started band, school and band enrollment, amount of instrumental practice time and non-musical study time per week. Musical activities measured the number of years the student participated in all-state band, all-state orchestra, concert festivals, solo-ensembles, marching contests, instrumental private lessons, church/community choir, parades, jazz band, and community band. In addition, students described educational/musical characteristics of their most influential secondary musical educator.

3. **College** questions included student's college GPA, scholarships (musical, academic, other), amount of study time spent on non-musical courses and other musical courses, and number of nights and amount of time practiced on major instrument. The students described the percentage of time spent on specific practice activities such as scales, etudes, band music, sight-reading, solos, improvisation, other activities, and the percentage of time a metronome was used during practicing. Additional questions included time spent

listening to serious music per week, number of classical/jazz concerts attended per year, number of years the student took private instrumental, piano, and vocal lessons, number of recital performances per year, and number of ensembles the student participated in during the year.

In addition, freshmen were asked to list principal reasons why freshman music majors change their major to non-music fields.

Colwell's MAT3. This research used Colwell's Music Achievement Test 3 (MAT3) to evaluate the musical independence (MI) of Ball State University students who participate in the Wind Ensemble (WE), Symphony Band (SB), and/or the Concert Band (CB). These organizations have specifically defined missions. The WE and SB are "designated ensembles," fulfilling student performance requirements. The WE is the top or elite band whose membership is selected through audition. The SB is the largest of the three concert ensembles. The CB is the training and recreational organization. The WE, SB, and CB rehearse six, four, and two hours per week, respectively. The better instrumentalists are selected to perform in the WE; the remaining instrumental majors are assigned to the SB; and the weaker students are assigned to the CB. The SB and CB students advance to the WE when they are needed or when they have acquired a higher level of musical independence.

Colwell's MAT3 was used for this project because it best evaluates the student's musical independence (Bobbett, 1987), is easily administered, and has previously determined reliability estimates and validity. Colwell (1970) used the Kuder Richardson 21 (KR21) to evaluate the MAT3's internal consistency for grades 9-12. The KR21 ranged from .814 to .892 for students with instrumental experience. The MAT3 consists of four subtests (ST): (1) Tonal Memory (ST1), (2) Melody recognition (ST2), (3) Pitch Recognition (ST3), and (4) Instrument Recognition (ST4).

What distinguishes the skills tested by the MAT3 from identified skills found in other achievement tests? Essentially, skills are acquired from experience, study, or a combination of the two. When students learn a particular discipline exclusively from textbooks, they miss many of the subtleties and idiosyncrasies of the particular discipline. In other words, book knowledge divorced from practical experiences has limited value. Obviously, the music student needs to practice and participate by performing the music

either individually or with other musicians. Strictly academic skills may or may not be meaningful other than as intellectual exercises. Subtle discrimination skills are learned only through the student's collective musical experiences.

IV. DATA ANALYSIS

ISCS and Colwell's MAT3 were administered to the Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB). The **ISCS** data analyses included: (A) general, (B) high school, and (C) college general, practice and other music activities. **MAT3** data analyses included: (A) ensemble and subtests/grand total score, (B) college major, (C) class, (D) gender, and (E) instrument. **Correlational** analyses included: (A) MAT3 with ISCS data, (B) ISCS analyses which included: 1) high school GPA, 2) college GPA, and 3) SAT scores. **Content analyses** evaluated students opinions and suggestions. Statistical analysis included descriptive, inferential (analysis of variance or ANOVA) , Scheffe, t-test), and correlational (Pearson's Product Moment) analysis. Content analysis was used to analyze the ISCS discussion items. The level of significance for this study was $p \leq .05$.

ISCS ANALYSES

As a preliminary step, the researchers calculated means and percentages for three ISCS sub-categories: (1) general demographics, (2) high school activities, and (3) college activities and perceptions.

A . General Of the 153 Ball State band students who participated in the study, there were **48** WE students, **77** SB students, and **28** CB students. As Table 1 illustrates, the WE had the highest percentage of woodwind students, the SB had largest percentage of brass students, and the CB had the largest percentage of percussion students. The predominantly white (150 white, 3 black, and 1 oriental) ensembles had more males than females. The WE students were older and had more instrumental experience. The WE had a small percentage of freshman (19%, 25%, 35%, 21%, 0%, freshman to graduate student), while the majority of the SB (53%, 25%, 13%, 6%, 3%, respectively) and CB (50%, 21%, 25%, 0%, 4%, respectively) were freshman. The WE had the largest percentage of music majors and the most piano experience. In each ensemble, the students' fathers had more college experience than their mothers.

Table 1 Students' mean ($\bar{X}$) scores for general demographic data for Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB
GENERAL DEMOGRAPHIC			
n	48	77	28
Woodwind %	42	27	36
Brass%	33	60	32
Percussion %	25	13	32
Males %	60	57	64
Age-years	20.3	19.4	19.4
Inst. Experience-years	9.3	7.7	8.7
Music Majors %	89	69	54
Piano Experience-years	2.8	2.6	2.0
Father's college-years	2.0	2.4	1.8
Mother's college-years	1.7	2.0	1.7

B. High School Table 2 illustrates that students in the WE, SB, and CB had approximately the same high school GPA, SAT scores, and started playing a band instrument in approximately the same grade. WE members graduated from larger high schools and participated in larger band programs than SB or CB students. The students from all three ensembles participated in programs representing a large percentage of their total high school enrollments. The students were pooled and the typical student's music program included 12.5% of their high school's enrollment. WE students exhibited the most practice time per week while CB students studied non-music courses the most. In the three ensembles 96% of the members were from Indiana and 6% were from out-of-state.

Table 2 Students mean ($\bar{X}$) high school activities for Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB
HIGH SCHOOL ACTIVITIES			
Grade Point Average	3.22	3.16	3.25
SAT scores	1000	1007	969
Year started band	5.6	5.8	5.6
High school size	1401	1158	1000
Band Enrollment	138	127	116
Band % of school	12.6	12.0	14.1
Minutes practiced/ week	499	337	333
Minutes studied/week	451	434	669

C. High School Musical Activities The WE, SB and CB students' high school musical activities were evaluated (see Table 3). The WE members were compared to CB members and were found to have participated significantly more years in All-State Band (ASB), All-State Orchestra (ASO), concert festival (CF), solo-ensemble (SE), private instrumental lessons (PL), parades (PA), and more, but not significantly more, years in All-State Choir (ASC) and community band (CB). SB members had the most years of participation in marching contests (MC), church/community choir (CCC), and jazz band (JB). The CB had the smallest mean yearly participation for each of the 11 high school musical activities. The ANOVA used to compare the WE, SB, and CB students produced significant differences among the three organizations in all-state band, all-state orchestra, concert festival, solo-ensemble, private instrumental lessons, parades, and jazz band. The Scheffe F-test was used to evaluate the ANOVA significant differences. The WE was significantly larger than SB for all-state band, and the WE had significantly different high school activity mean scores than the SB for all-state band, all-state orchestra, solo-ensembles, private music lessons, and parades. The SB had significantly higher scores than CB for solo-ensembles, private lessons, parades, and jazz band.

The WE, SB, and CB yearly total mean participation for the 11 high school musical activities was developed. The sum of the 11 activities by ensemble were evaluated. The WE had the largest yearly cumulative mean participation and the CB had the smallest. In addition, there was a three-year difference between the WE and SB, and a seven year difference between the SB and CB.

Figure 1 illustrates that WE students averaged two or more years in concert festival, solo-ensemble, marching contest, private lessons, and parades. WE students averaged 4 year in solo-ensemble--the music activity that had the highest yearly mean.

Table 3 The ANOVA was used to compare the mean ($\bar{X}$) years participation for high school (HS) music activities for students Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB), and Scheffe was used to identify the differences.

Source	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB	*df* Between, Within Groups	*Sum Squares* Total	*E*
HS MUSIC ACTIVITY						
All-state Band (ASB)	1.1	.5	.1	2, 146	159	8.20 * 1,2
All-state Orch. (ASO)	.3	.1	.0	2, 146	48	2.87
Concert Festival (CF)	2.8	2.0	1.8	2, 146	591	3.34 * 2
Solo-Ensemble (SE)	3.9	3.5	2.0	2, 146	425	12.92 * 2,3
Marching contest (MC)	3.0	3.4	2.5	2, 146	148	2.89
Private Inst. Les. (PL)	3.2	2.4	1.0	2, 146	839	7.49 * 2,3
Ch./Com. Choir (CCC)	1.0	1.0	.7	2, 146	318	.58
Parades (PA)	3.9	3.8	3.1	2, 146	211	5.67 * 2,3
Jazz band (JB)	2.1	2.3	1.3	2, 146	479	3.36 * 3
Community band (CB)	1.4	1.0	.9	2, 146	358	1.39
All-state Choir (ASC)	.17	.04	.07	2, 146	36	1.05
Total	**22.9**	**20.0**	**13.5**			
Total Mean	2.1	1.8	1.2	2,1636	6,344	18.48 * 2,3

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WE vs. SB=1; WE vs. CB=2; SB vs. CB = 3

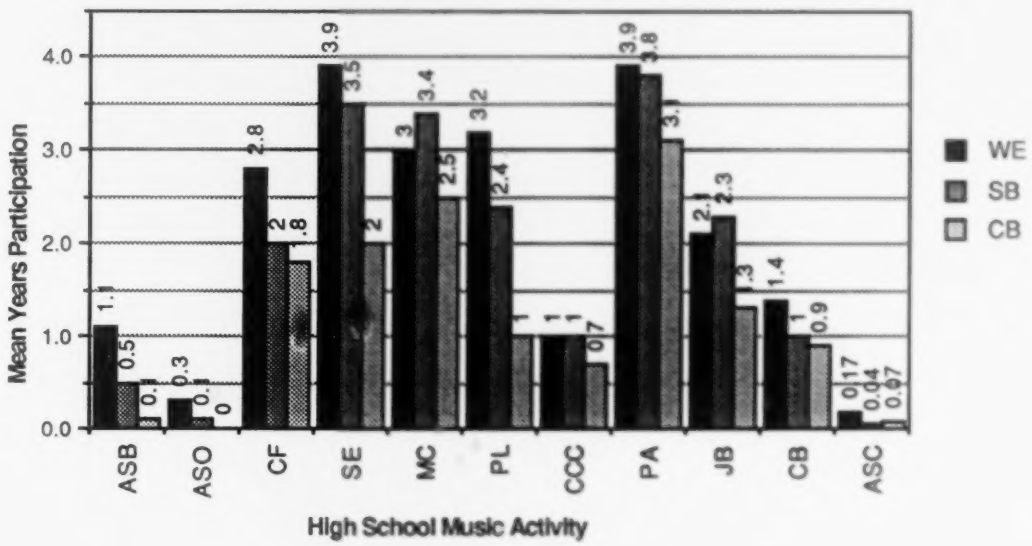

Figure 1 The 11 high school music activities for members of Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

C. College Activities

1. General Activities The ISCS "general activity" data for the WE, SB and CB were evaluated. Table 4 shows that the WE members had slightly higher college GPA scores, larger music scholarships, practiced more per week, studied more on music courses, and used the metronome the largest percentage of time during individual instrumental practice. The SB received the largest academic and "other" scholarships, and the CB studied non-music courses the most per week.

The analysis of variance (ANOVA) and Scheffe were used to evaluate the *three* ensembles mean scores. ANOVA was used to evaluate the WE, SB, and CB college general activity ISCS data. There was a significant difference between the WE, SB and CB college ISCS data for the amount of college music scholarship awarded per year, nights practiced per week, minutes the students practiced their instrument per week, and the percentage of time studied on other music courses (non-practicing).

The Scheffe F-test was used to analyze the significant ANOVA data. The WE mean scores were significantly larger than the SB mean scores for music scholarships and nights practiced, WE had larger mean scores than SB for minutes practice per week, and SB was larger than the CB for minutes practiced per week and studying other music courses.

Table 4 ANOVA used to compare mean ($\bar{X}$) "general" college ISCS data for students in Ball State's Wind Ensemble, Symphonic Band, and Concert Band, and the Scheffe F-test used to evaluate differences.

Source	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB	*df* Between, Within Groups	*Sum Squares* Total	*F*
GENERAL ACTIVITY						
College GPA	3.07	2.86	2.93	2, 144	386,499	2.42
Music Scholarship ($/yr)	1173	481	300	2, 43	18,863,261	9.05 * 1
Academic Scholarship ($/yr)	1397	1693	1035	2, 41	102,398,034	.45
Other Scholarship ($/yr)	1275	1552	530	2, 20	58,985,034	.70
St. non-music cour. (min/wk)	459	533	729	2, 148	42,881,436	2.32
Night. Practice (night/wk)	4.8	3.6	3.6	2, 142	559	6.05 * 1
Instrument Practice (min/wk)	664	452	429	2, 147	17,855,968	7.08 * 2,3
Study Other Music (min/wk)	430	278	282	2, 142	11,244,203	4.87 * 3
Metronome	28	21	20	2, 132	107,436	1.01

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WE vs. SB=1; WE vs. CB=2; SB vs. CB = 3

2. Practice Activities The WE, SB, and CB student's seven practice activities were compared. The students indicated what percentage of time they spent on scales, etudes, band music, sight-reading, solo, improvisation, and "other". Table 5 indicates that there was a 10 percent difference or more for etudes, band music, and solos. The ANOVA was used to compare the mean practice percentages for the three ensembles. There were significant differences for etudes, band music, and "other". The Scheffe analyses indicated significant differences between the WE and SB for "other", between WE an CB for band music and "other", and differences between the SB and CB for etudes and band music. Note that CB students practice band music significantly more, not less, than SB students.

Several students qualified the type of practice activities they did when they indicated "other". Students' comments included making reeds, practicing lip slurs (several brass players), and making minor adjustments or repairing on their instruments.

Finally, the researchers assumed when designing the question that the more time students spent on a specific practice activity reflected the students urgency to accomplish specific instrumental skills, relative importance, artistic value, or level of difficulty.

Table 5 Results of ANOVA to compare seven mean ($\bar{X}$)practice activities of students who participated in Ball State's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB). The Scheffe F-test evaluated differences.

Source	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB	*df* Between, Within Groups Total	*Sum Squares*	*F*
PRACTICE ACTIVITY (%)						
Scales	13.5	15.1	18.8	2, 141	21,053	1.60
Etudes	19.2	26.4	10.6	2, 139	51,440	6.97 * 3
Band Music	11.7	18.3	34.1	2, 140	78,285	8.35 * 2,3
Sight-Reading	10.5	9.3	10.1	2, 141	12,163	.27
Solo	34.2	26.7	23.5	2, 142	68,922	2.58
Improvisation	6.0	3.7	2.7	2, 141	9,904	1.61
Other	6.6	.8	.4	2, 134	12,496	6.14 * 1,2

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WE vs. SB=1; WE vs. CB=2; SB vs. CB = 3)

Where moderate MI is represented by participation in the entry level or training music organization (CB), moderately advanced MI is represented by the SB, and advanced MI is represented by participation in the top-level musical organization (WE). Figure 2 shows

the differences between moderate MI (CB), moderately advanced MI (SB), and advanced MI (WE). Does this indicate that students change their practice agendas between moderate to advanced MI? When progressing from moderate to advanced MI, the students decreased the percentage of practice time on scales and band music, increased the percentage of practice time spent on solos, improvisation, other, and first increased and later decreased their emphasis on etudes. The total percentage of practice time spent on solos and etudes remained the same for both WE and SB students (53.4%, 53.1%, respectively). As the student advances toward MI, etudes tended to be replaced by solos. Sight-reading did not essentially change between WE, SB, and CB students.

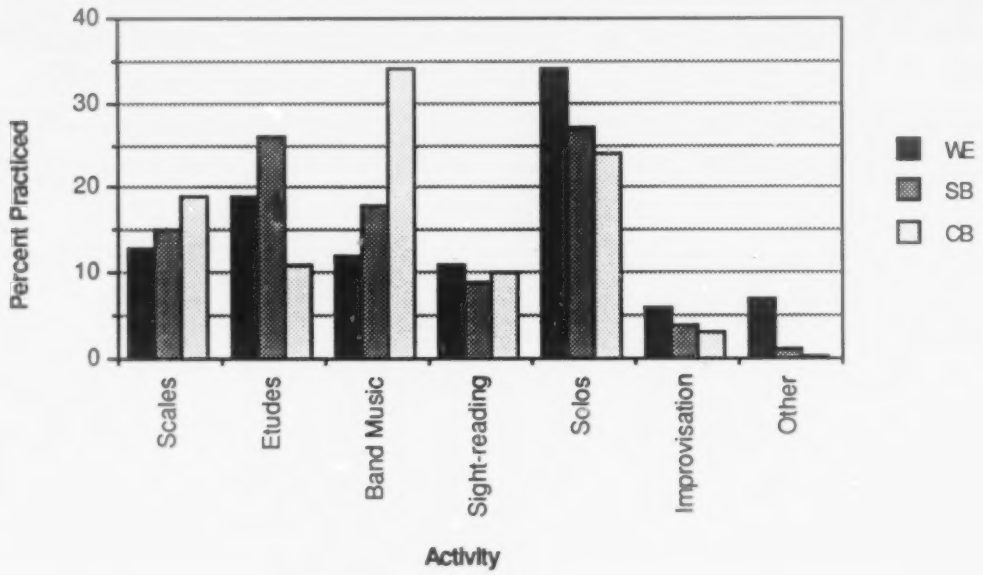

Figure 2 The percentage of practice time spent on the seven practice activities by instrumental students participating in Ball State's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

The mean percentage of student time spent on a specific practice activity multiplied by the ensemble's total weekly practice time indicated the student's weekly practice priorities (SWPP). Table 6 indicates the mean time practiced for the seven practice activities for the WE, SB, and CB. Note that the WE practiced more minutes per week for six of the seven practice activities and the CB practiced the least for the same six practice activities.

Where Figure 2 indicates the organization's mean percentage of time spent on each practice activity, Figure 3 illustrates the students' weekly time-on-task. Note that in all

Table 6 Mean ($\bar{X}$) minutes (min) per week (wk) practiced by students participating in Ball State's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB) on seven practice activities.

	$\bar{X}$ **WE** min/wk	$\bar{X}$ **SB** min/wk	$\bar{X}$ **CB** min/wk
PRACTICE ACTIVITY (percentage times minutes practiced per week)			
Scales	89.7	68.3	49.4
Etudes	124.4	119.3	27.9
Band Music	77.7	82.7	89.7
Sight-reading	69.7	42.0	26.6
Solos	227.1	120.7	61.8
Improvisation	39.8	16.7	7.1
Other	43.8	3.6	1.1

practice areas, except band music, the WE practiced the most minutes per week, and the CB practiced the least. In addition, note the "etude" practice area below in Figure 3; there is a slight drop between WE and SB and a much larger drop between SB and CB.

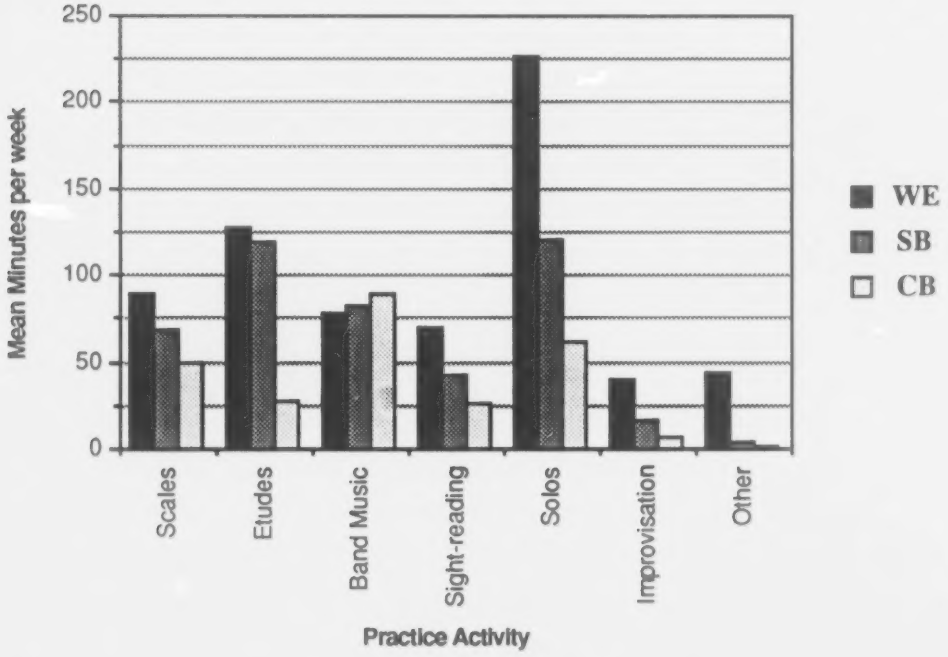

Figure 3 Students' mean minute practice time per week for Ball State's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

3. Other Music Activities The association between "other musical activities" and musical growth were evaluated (see Table 7). The WE attended the most classical concerts, had the most instrumental private lessons and piano lessons per year, attended the most recitals per year, and participated in the most ensembles per year. The CB student listened more to serious music per week and attended the most jazz concerts per year. The SB participant had slightly more voice lessons per year.

The ANOVA was used to compare the other music activities mean scores. There were significant differences for the number of classical concerts, instrumental lessons, and recitals per year, and number of ensembles the student participated in per year. The Scheffe analyses indicated that the WE had significantly higher means than the SB for classical concerts per year, instrumental lessons per year, and number of ensembles the student participated in per year, and had higher means than the CB for instrumental lessons, recitals, and ensembles. The SB had significantly larger mean scores for number of ensembles the student participated in per year.

Table 7 Results of ANOVA to compare students' "Other" music activities by ensemble for Ball State University's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB), and Scheffe results to compare differences.

Source	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB	*df* Between, Within Groups	*Sum Squares* Total	*F*	
OTHER MUSIC ACTIVITIES							
Serious Listening (min/wk)	373	333	515	2, 141	3,400,756	1.29	
Classical Concerts (n/yr)	14.5	7.5	8.7	2, 142	15,956	7.45 *	1
Jazz Concerts (n/yr)	6.6	4.8	6.8	2, 132	5,057	1.52	
Instrumental Lessons (n/yr)	2.8	1.5	1.2	2, 142	237	27.93 *	1,2
Piano Lessons (n/yr)	1.00	.90	.8	2, 139	156	.21	
Voice Lessons (n/yr)	.16	.21	.17	2, 132	40	.10	
Recitals (n/yr)	3.5	2.3	1.7	2, 137	1,034	4.26 *	2
Ensembles (n/yr)	4.5	3.6	2.4	2, 146	399	17.92 *	1,2,3

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WE vs. SB=1; WE vs. CB=2; SB vs. CB = 3

MAT3 ANALYSES and MI

A. Ensembles and MAT3's subtests/grand total score. Colwell's MAT3 was administered to 48 WE, 77 SB, and 28 CB students. It should be noted that four WE members, including three first chairs, were unable to participate in the research due to other prior musical commitments. The WE students scored highest on (see Table 8) all MAT3 subtests and grand total (GT) score, the SB scored highest on ST1, and the CB scored lowest on all four subtests.

The ANOVA was used to compare the WE, SB, and CB students subtests and grand total MAT3 scores. The ANOVA analyses indicate that the four MAT3 subtests and grand total mean scores between the WE, SB, and CB were significantly different. The Scheffe F-test was used to identify the differences. The WE had significantly higher scores than the CB students for ST2, ST3, ST4 and GT score, and the SB had significantly higher scores than the CB students for all subtests and grand total mean score.

Table 8 Results of ANOVA to compare the MAT3 subtests and grand total (GT) scores for Ball State University's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB), and Scheffe results to evaluate the differences.

Source	$\bar{X}$ WE	$\bar{X}$ SB	$\bar{X}$ CB	*df* Between, Within Groups	*Sum Squares* Total	*F*	
MAT3							
n	48	77	28				
ST1	16.7	16.7	15.3	2, 150	1,037.06	3.51	* 3
ST2	14.4	14.4	12.0	2, 150	1,623.07	6.34	* 2,3
ST3	14.9	14.1	11.7	2, 150	1,915.88	8.06	* 2,3
ST4	13.5	13.0	11.7	2, 150	413.90	12.03	* 2,3
GT	58.9	58.1	50.6	2, 150	10,110.67	12.20	* 2,3

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WE vs. SB=1; WE vs. CB=2; SB vs. CB = 3

The WE, SB, and CB students' mean scores for the four subtests and the total score were converted to percentile scores (Colwell, 1970). As illustrated in Figure 4, the WE and SB percentile scores were the same on ST1, ST2, and ST3. The WE scores were highest on ST4 and the total MAT3, and the CB scored lowest on all subtests and the grand total MAT3.

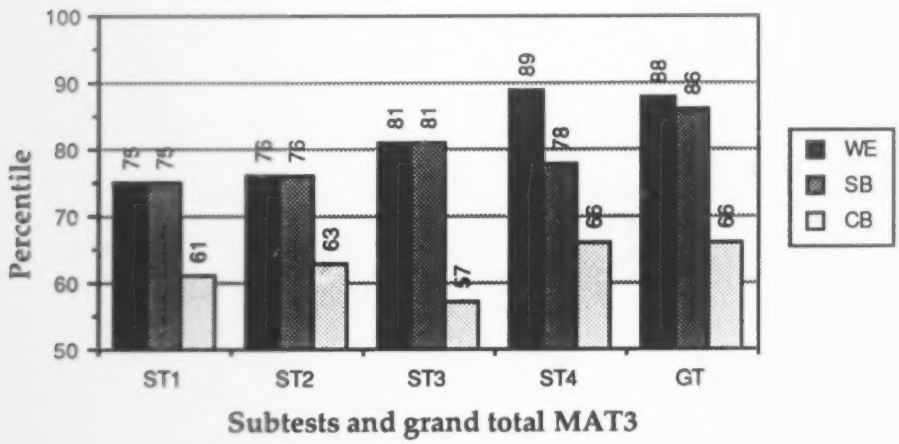

Figure 4 MAT3 subtests and grand total percentile scores for Ball State's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

B . Music Major v. Non-Music Major. The WE, SB, and CB students were pooled, and the music majors' (MM) and non-music majors' (NMM) MAT3 scores were evaluated. Table 9 illustrates that MM scored significantly higher than NMM on subtests ST2, ST3, ST4 and grand total score.

The MM and NMM data may be artifact material because the majority of all three ensembles were MM (89%, 69%, and 54%, respectively). Where the post-secondary instructors screened the students through an audition process and placed them in the appropriate organization (i.e., the WE, SB, or CB), the MM/NMM data analysis shows the influence of the educational process on the student's musical maturity. In essence, the MAT3 was effective in differentiating between skilled and lesser-skilled instrumental music students.

Table 9 The t-test was used to compare the MAT3 subtests (ST1, ST2, etc,) and grand total mean (M) scores for music majors (MM) and non-music majors (NMM) in Ball State University Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

	College Major			
Source	MM	NMM	*df*	*t*
n	106	39		
ST1	16.6	15.7	143	1.761
ST2	14.4	12.5	143	3.195 *
ST3	14.5	12.2	143	3.508 *
ST4	13.1	12.4	143	2.195 *
GT	58.5	52.9	143	3.770 *

* $p \leq .05$ (t-test)

C Class and Major

1. MAT data. The WE, SB, and CB were pooled and the music majors and non-music majors subtests and total MAT3 scores (see Table 10) were evaluated by both class and major. Table 10 illustrates the MM and NMM mean subtests and GT score by class. The researchers did not include data for graduate MM, or senior/graduate NMM because the samples had two or fewer participants. The ANOVA was used to compare the four classes. There was no significant difference between the MAT3 subtests and grand total scores fo. the freshman, sophomore, junior, or senior music majors, or freshman, sophomore, or junior non-music majors.

There is a decline in MM scores between freshmen students and sophomores, and a

two year decline in NMM scores between freshmen and juniors. In addition, class MAT3 percentile scores for MM are consistently higher than class scores for NMM.

Table 10 Results of ANOVA to compare the MAT3 subtests (ST1, ST2, etc.) and grand total (GT) mean scores by class (freshmen (FR), sophomores (SO), juniors (JR), senior (SR)) and major (music major (MM) vs non-music major (NMM)) for Ball State University's Wind Ensemble (WE), Symphonic Band (SB), and Concert Band (CB).

	$\bar{X}$ FR	$\bar{X}$ SO	$\bar{X}$ JR	$\bar{X}$ SR	*df* Between, Within Groups	*Sum Squares* Total	*F*
MUSIC MAJOR							
n	*43*	*23*	*26*	*13*			
ST1	16.6	16.0	17.1	16.6	3, 101	520	1.03
ST2	14.0	14.4	14.8	14.7	3, 101	979	.40
ST3	14.4	13.6	15.0	15.0	3, 101	1,231	.79
ST4	13.0	13.0	13.1	13.5	3, 101	245	.30
GT	58.0	57.0	60.0	59.8	3, 101	5,696	.87
NON-MUSIC MAJOR							
n	*17*	*10*	*8*	--			
ST1	16.1	15.1	14.4	--	2, 32	427	.70
ST2	11.9	13.3	10.9	--	2, 32	359	1.18
ST3	12.9	10.8	11.3	--	2, 32	378	1.59
ST4	12.2	12.4	12.0	--	2, 32	122	.09
GT	53.1	51.6	48.6	--	2, 32	2,871	.68

2. MAT3 percentile data. The grand total MAT3 scores were converted to percentile scores. Figure 5 illustrates a slight drop between freshmen and sophomore music majors, an increase between sophomores and juniors, and a slight decline between the juniors and seniors. The non-music majors' grand total MAT3 percentile scores had a steady decline from freshman to junior.

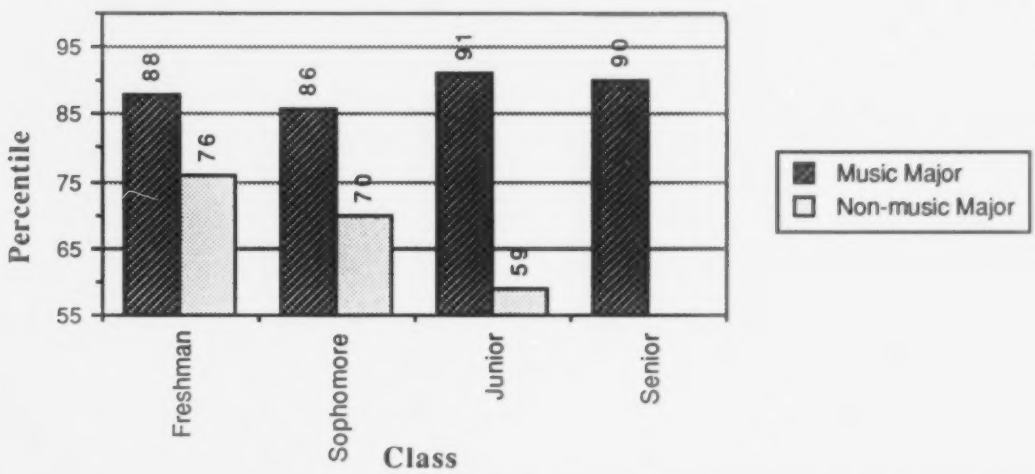

Figure 5 Music major and non-music majors MAT3 percentile score for the MAT3 four subtests and grand total score for Ball State University Wind Ensemble, Symphonic Band, and Concert Band.

D. Gender. The WE, SB, and CB students were pooled and there were 90 male and 63 female students who took Colwell's MAT3. The male students scored significantly higher on ST1, ST2, ST3, and grand total MAT3 score, and higher on ST4 (see Table 11).

Table 11 The t-test was used to compare the MAT3 subtests and grand total scores by gender for pooled students in Ball State's Wind Ensemble, Symphonic Band, and Concert Band.

	Gender			
	Male	**Female**	***df***	***t***
n	90	63		
ST1	16.4	16.0	151	1.769 *
ST2	13.9	13.4	151	2.191 *
ST3	13.9	12.9	151	2.969 **
ST4	13.0	12.9	151	.064
GT	57.1	55.0	151	2.686 **

* $p \leq .05$ (t-test) ** $p \leq .01$ (t-test)

E. Instrument.

1. Total Students. There were 153 students in the Ball State University's WE, SB, and CB consisting of 51 woodwind, 71 brass and 31 percussion students. The MAT3 subtests and GT scores were evaluated. Table 12 illustrates that brass students mean scores were highest on all of the MAT3 subtests and the grand total mean score, and woodwind students were lowest on ST1 and ST2, while percussion students were lowest on ST3, ST4, and the grand total score.

ANOVA was used to evaluate the pooled WW, BR, and PR students scores on the MAT3. There was a significant difference between the three instrumental sections for ST2, ST3, and grand total score. The Scheffe F-test was used to compare instrumental sections two at a time. The WW students scored significantly lower than the brass students for ST2, ST3, and GT score, and the percussion students scored significantly lower than the brass students on ST3.

Table 12 Pooled woodwind (WW), brass (BR), and percussion (PR) instrumental students' MAT3 subtests and grand total score for students participating in Ball State's Wind Ensemble, Symphonic Band, and Concert Band.

	Instrument					
	$\bar{X}$ WW	$\bar{X}$ BR	$\bar{X}$ PR	*df* Between, Within Groups	*Sum Squares* Total	*F*
n	51	71	31			
ST1	16.3	16.4	16.5	2, 150	1,037	.05
ST2	13.1	14.8	13.4	2, 150	1,623	4.64 * 1
ST3	13.1	15.1	12.5	2, 150	1,916	8.64 * 1, 3
ST4	12.8	13.1	12.7	2, 150	414	.84
GT	55.3	59.3	55.1	2, 150	10,661	4.97 * 1

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WW vs. BR=1; WW vs. PR=2; BR vs. PR = 3

2. Instrument: Music Majors Pooled. The WE, SB, and CB music major were pooled and the 30 woodwind, 50 brass and 25 percussion students' MAT3 subtests and GT scores were evaluated. Table 13 illustrates that woodwind students' mean scores were highest on ST1 and ST4, and the brass students were highest on ST 2 and ST3 and grand total MAT3 score. The percussion students scored lowest on ST2, ST3, ST4, and total MAT3, and the brass students scored lowest on ST1. The ANOVA was used to compare the three instrumental sections. There was a significant difference for ST3. The Scheffe

F-test indicated that the brass students scored significantly higher than percussion students on ST3.

Table 13 ANOVA results for comparison of the pooled music major woodwind (WW), brass (BR), and percussion (PR) instrumental students' MAT3 subtests and grand total score for students participating in Ball State's Wind Ensemble, Symphonic Band, and Concert Band, and Scheffe results of comparison of instrumental sections two at a time.

	Instrument					
	$\bar{X}$ WW	$\bar{X}$ BR	$\bar{X}$ PR	*df* Between, Within Groups	*Sum Squares* Total	*F*
n	30	50	25			
ST1	17.2	16.3	16.6	2, 102	628.8	1.46
ST2	14.2	14.8	13.6	2, 102	1238.1	1.29
ST3	14.4	15.4	12.8	2, 102	1604.2	5.11 * 3
ST4	13.3	13.2	12.9	2, 102	308.1	.52
GT	59.2	59.7	55.9	2, 102	7185.5	2.44

* ANOVA ($p \leq .05$) Scheffe ($p \leq .05$): WW vs. SB=1; WW vs. PR=2; BR vs. PR = 3

CORRELATIONAL ANALYSES.

A. MAT3 with ISCS Data. Ball State University's WE, SB, and CB were pooled and Pearson Product Moment Correlations were used to evaluate ISCS data (general, high school, and college demographic data) with MAT3 grand total scores. Significant correlations were noted for each of the three demographic areas.

The general demographic data with positive significant correlations were student **age** (n=149, r=.229) and the number of years the **father** (n=147, r=.209) and **mother** (n=152, r=.291) attended college. The highest significant correlations using high school demographic data were **SAT** scores (n=132, r=.313), number of years in **All-State Band** (n=149, r=.309), number of years of private **piano lessons** (n=75, r=.282), and the number of years the student participated in **jazz band** (n=149, r=.274).

There were five significant positive correlations between College demographic data and MAT3 scores: (1) number of years of private **instrumental lessons** (n=145, r=.371), (2) number of minutes **practiced per week** (n=150, r=.201), (3) **number of**

ensembles in which the student participated (n=149, r=.283), (4) percentage of practice time spent on **etudes** (n=142, r=.316), and (5) number of years the student took **piano lessons** (n=142, r=.199). There was a negative correlation between practice time spent on **band music** (n=143, r=-.410) and the MAT3.

B . ISCS seven postsecondary practice activities with subtests and grand total MAT3 scores.

The percentage of time practiced by each student (pooled WE, SB, and CB) and the student's percentage of time spent on each of the seven practice activities were used to calculate the number of minutes each student practiced each of the seven practice activities. The Pearson Product Correlation (see Table 14) was used to compare the students' seven activities with their MAT3 subtests and grand total score.

Band music was the only practice activity that had a negative correlation for each of the subtests and the grand total score, while the other six practice activities indicated a positive correlation for both subtests and grand total score. When the MAT3 grand total scores were compared to the pooled sample of students, **Etudes** was the only practice activity with a significantly positive correlation, while **Band Music** had a significantly negative correlation.

The highest significantly positive correlation ($p \leq .01$) was between Improvisation and ST3 (**Pitch Recognition**: the student matches the written interval on the MAT3 answer sheet and the one played on the MAT3 audio test).

Table 14 Pearson Product correlation used to compare Colwell's subtests and grand total score and the students' seven practice activities for students participating in Ball State's Wind Ensemble, Symphonic Band, and Concert Band.

	n	ST1	ST2	ST3	ST4	GT
Scales	143	.057	.038	.018	.092	.062
Etudes	141	.094	.152	.149	.153	.173 *
Band Music	142	-.171 *	-.152	-.223 **	-.110	-.244 **
Sight-reading	143	-.001	.074	.112	.137	.107
Solo	144	.161 *	.044	.069	.176 *	.139
Improvisation	142	.039	.111	.236 **	.101	.142
Other	141	.001	.013	.045	.004	.034

Significant correlation
* ($p \leq .05$) [n=125 and r=.174; n=150 and r=.159]
** ($p \leq .01$) [n=125 and r=.228; n=150 and r=.208]

C. ISCS Correlation Analysis. High school GPA, SAT scores, and college GPA are three widely used academic indicators. These ISCS items were evaluated, by using the Pearson's Product Moment Correlation analysis, and significant correlations between these academic indicators and other ISCS items were evaluated.

1. High School GPA. In identifying and evaluating factors contributing to MI, high school GPA was correlated with all of the ISCS items. Of 60 plus ISCS high school and college items, student's **SAT** score (n=125, r=.493), **College GPA** (n=136, r=.611), and number of years the student took **piano lessons** (n=137, r=.217) during high school had a significantly positive correlation.

2. College GPA. The student's college GPA was compared to other ISCS items. The general items with significantly positive correlations were the number of years the student took **piano lessons** (n=142, r=.212) during high school and the number of years the **mother** (n=146, r=.262) attended college. The student's **SAT** score is the only high school item with a significant positive correlation (n=127, r=.405). The college ISCS items with significant correlations were the amount of **music scholarships** (n=46, r=.296), **academic scholarships** (n=44, r=.301), number of **nights the student practiced** (n=139, r=.164), number of **classical concerts** attended per year (n=140, r=.227), and the number of **minutes** per week the student practiced (n=144, r=.237).

3. SAT scores SAT scores had the fewest number of positive correlations with other ISCS items. There was a significant correlation between SAT scores and number of years the student participated in **All-state** band (n=131, r=.215) and **college GPA** (n=127, r=.405) and negative correlations between percentage of time spent practicing college **band music** (n=126, r=-.234) and the amount of time using a **metronome** (n=117, r= -.234) during college practicing.

CONTENT ANALYSES

1. Question 18 (ISCS): ***"Nationally, during or after the freshman year, some music majors change their majors to other academic disciplines. In***

your opinion, what are the principal reason students change?"

Figure 5 shows a 2 percentile drop in MAT mean percentile scores from freshman to sophomore music majors. A similar drop was noted for the University of Tennessee students' (Bobbett, 1989). Content analysis evaluated 23 freshman music-majors who received an MAT3 grand total score of 56 or higher. "Hard work" (39%), music theory is too difficult (30%), and financial considerations after graduation (30%) were the three most mentioned reasons for changing their major. Other student explanations included: "Too much competition" (22%), not having the necessary "talent" to remain as a music major (22%), and being a music major required "too much time" (18%).

V. CONCLUSIONS

1. MI is developed by participating in numerous and varied high school ensembles and/or musical activities.

Advanced musically independent students performing in Ball State's Wind Ensemble participated more years in all-state band, all-state orchestra, concert festival, solo-ensemble, private instrumental lessons, parades, all-state choir, and community band than the students in the Concert Band. Symphonic Band students--less musically independent than Wind Ensemble students but more independent than Concert Band students--participated more years in marching contests, church/community choir, and high school jazz band than Concert Band students. The mean years of participation in high school activities for WE, SB, and CB students exhibits the same downward trend as the ensembles' respective MAT3 scores: there is a small drop between WE and SB, and a larger drop between SB and CB.

2. MI students are musically involved.

Advanced musically independent students participate in more high school and college ensembles, practice more nights per week in high school and more minutes per day and nights per week in college. Advanced MI college students took more piano lessons and instrumental private lessons, participated in more recitals, earned higher SAT scores, and attended more classical concerts. The moderately MI students appeared both academically and musically passive. Although they studied non-music courses more minutes per week and listened to serious music more minutes per week, they participated in the above

mentioned high school and college activities, less. They were willing to listen to serious music but not willing to practice their instrument or participate in as many performing ensembles. MI is not a spectator sport; MI is built from active, concentrated participation as a way to improve.

3. Quantitative and qualitative practice time is related to musical growth.

There appears to be a strong linkage between the amount of time spent practicing and sustained musical growth. Advanced MI students emphasized etudes and solos during their practice time, whereas the moderately MI students emphasized band music. Of all the practice activity areas, the trend between WE, SB, and CB minutes practiced per week on etudes most closely resembles the MAT3 trend --there is a small drop between WE and SB and a larger drop between SB and CB.

Advanced MI students analyze their strengths and weaknesses and develop a regiment of practice that further separates them from less advanced students. Advanced MI students recognize the importance of musical fundamentals needed to develop a sound musical foundation. These fundamentals are specifically addressed in etudes and then applied in solos.

In addition, advanced MI students use the **metronome** more than the moderately MI students and therefore appear to recognize discipline and structure as an important activity during instrumental practice.

As the MI students progress to more advanced levels, they realize that a broader, more comprehensive foundation prepares them to master present and future musical hurdles. The advanced MI students know, recognize, and apply these musical insights.

4. MI is enhanced by some academic/family indicators.

There is a significant, positive correlation between the student's SAT score, student's college GPA, the number of years the father attended college, and the student's age with MI. Advanced MI students took more years of piano lessons than the moderately MI student. A student taking high school piano lessons is, in part, a parental decision, possibly influenced by the family's cultural values and/or academic expectations.

Interestingly, there appears to be no significant correlation between the student's high school GPA and MI.

5. Acquiring and developing MI consists of four areas: native intellectual skills, musical experiences, time on task, and effective study habits.

ISCS academic items correlate to other academic items, music items correlate to other music items, but music items do not have a high, positive correlation with most academic items. To develop student or program MI, the students have to possess at least moderate intelligence, be exposed to many enriched musical activities, work hard and spend many hours per week practicing correctly and efficiently. A deficiency in one or more areas will impede the student's musical independence. The notion of talent is often misunderstood. The non-musician recognizes some musical skills, but does not realize that "talent" is essentially dedication, discipline, correct decisions regarding all aspects of musical growth, and what and how to practice. The advanced MI student realizes that musical excellence is developed by the proper blend of many activities and attitudes.

6. MI may be influenced by gender.

At higher or more advanced levels of MI, males appear to be more MI than females. Other studies (Bobbett, 1989,1990) have noted this possible gender difference. It is interesting to note that while woodwind (WW) tend to score higher than brass (BR), and BR higher than percussion (PR) on the MAT3, more women play WW than BR or PR! Instead of gender bias, there may be other considerations such as professional expectations, job limitations, or social considerations that might skew the available data. Presently, the data are insufficient because the number of female participants was relatively small, and the MAT3 test scores were not significantly different.

7. MI is recognized and evaluated by post-secondary instructors.

Post-secondary instrumental instructors screen and evaluate their students using an audition process. The audition results determine both the ensemble assignment and chair placement. Post-secondary instructors also use this information to determine the size and number of music scholarships. This study showed that the advanced MI students received the scholarships and were assigned to the top musical ensembles. This would have been

impossible without the post-secondary instructor making correct judgements in distinguishing levels of musical skills between the moderately and advanced MI student.

8. Advanced MI freshmen music majors are more likely to quit or change their majors than moderately MI freshmen music majors.

It appears that advanced MI freshmen music majors are more inclined to drop out of music than moderately MI freshmen music majors. This phenomenon was observed in another post-secondary study (Bobbett, 1989). Since university faculty cannot control post-graduation financial considerations (low pay), perhaps they should address the 30 percent of respondents who indicated difficulty with theory as a reason for changing majors.

9. Playing certain instruments contributes more to developing MI than playing other instruments.

Woodwind and brass instrumental students are more MI than percussion students. A plausible explanation for this phenomenon is that Colwell's MAT3 evaluates tonal discrimination. Except for playing tonal percussion instruments (xylophone, marimba, etc.), percussion students are often trained in rhythm discrimination rather than tonal discrimination. Moreover, these tonal percussion instruments are not emphasized in many bands. This finding may be an artifact of the measurement device. Moreover, these tonal percussion instruments are often not emphasized in many high school band programs.

10. MI is related to high school activities, college music and other activities, and on the amount and percentage of time a student practices specific practice activities.

There is a relationship between musical independence and the students' life-time musical activities: mastering music is not as much a mysteriously obtained talent or accident at birth, but is related to the student's number and quality of musical experiences. The magnitude of difference between the MAT3 subtests ST2, ST3, ST4 and grand total MAT3 for the WE and SB is not significant and is comparatively small, but the magnitude of difference between the SB and CB is significant and larger. The student's participation in a

variety of meaningful musical activities has a direct relationship to the level of their musical independence.

WE had significantly larger mean scores than the CB for the high school activities *all-state band*, *concert festival*, *solo-ensemble*, *private lessons*, and *parades*, and the SB's magnitude of difference for *solo-ensemble*, *private lessons* and *parades* are significantly larger that CB mean scores.

In the college category general activity, the WE is significantly larger than the CB for *minutes practiced per week* on the instrument, and the SB is significantly higher mean scores than the CB for *instrumental practice per week* on their instrument and *study of other music*. In the college practice activity, the WE students spent significantly smaller percentage of time on *band music* and significantly more time on "*Other*", and the SB spent a larger percentage of time on *etudes* and significantly less on *band music*. Finally, for the college category other music activities, the WE had significantly more *instrumental lessons*, gave more *recitals* in college and participated in more *ensembles* during the year than the CB students, while the SB students participated in significantly more *ensembles* than CB students.

11. MAT3 may be a valuable instrument in targeting outstanding postsecondary music students for recruitment or postsecondary student/program evaluation.

MAT3 can be quickly and easily administered to large groups of people or on an individual basis, providing useful recruitment information. One common thread of the Reform movement is assessing student outcome. To evaluate outcome, skills must be identifiable and measurable (Bobbett, 1989a, 1990).

12. MI is not positively influenced by practicing band music or playing in a postsecondary band.

It appears that MI, at the postsecondary level, is not enhanced when the individual's primary practice area is band music (see Table 14). Furthermore, participation in postsecondary band, when not accompanied by other related music activities (i.e., ear-training, private instrumental lessons, etc.), does not appear to enhance MI (see Figure 5). This is not surprising when one considers the artistic, rather than instructional, intentions

of the composers of serious band music.

While MI as tested by the MAT3 is not enhanced by participating in bands, there may be other higher level performance areas such as balance, blend, tone, intonation, dynamic nuance, phrasing and style, that are not measured by MAT3. While MAT3 measures lower level skills, there appears to be a strong connection between the lower and higher level skills.

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